

**IMMUNOCONTRACEPTION OF WHITE-TAILED DEER AT
FIRE ISLAND NATIONAL SEASHORE**

**2004 Progress Report to Fire Island National Seashore
And
The New York State Department of Environmental Conservation**

**Submitted by
The Humane Society of the United States
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I. INTRODUCTION

The first five year phase (1993-1997) of the Fire Island National Seashore (FIIS) deer immunocontraception project, conducted by the Humane Society of the United States (HSUS), was intended to test whether porcine zona pellucida (PZP) immunocontraception vaccine could be delivered effectively to deer in the field, and whether vaccine efficacy under field conditions matched that in more controlled situations. This phase also examined the practicality of using local residents (deer monitors) to identify individual deer before being delivering PZP treatments.

The 1993-1997 study confirmed that PZP vaccine could be delivered to large numbers of free-ranging, mostly habituated deer, but vaccine efficacy was lower than that seen in more controlled studies. The study also confirmed that vaccine efficacy increased with successive annual booster treatments and that after five successive years of treatments fawning rates decreased nearly 90%. The study also showed that using deer monitors to identify individual deer for treatment was very effective, but extremely labor intensive (Kirkpatrick et al. 1997; Naugle et al. 2002).

During 1998-2002, the second five year phase of the FIIS deer project was conducted by the HSUS, FIIS, National Park Service (NPS), and the United States Geological Survey (USGS). The principal goal of this phase was to determine whether the PZP vaccine could be a useful deer management tool within Fire Island communities and on FIIS lands. Specific objectives included the demonstration of a reduction in the deer population in the communities; the scaling back and eventual elimination of the labor intensive deer monitoring system; using a marking system to identify treated deer; the use of distance sampling methods to estimate population density and composition; reduction of the total amount of bait and bait stations used to attract deer for darting; shortening the time that bait is available; and the relocation of bait stations outside the communities to the extent consistent with effective and efficient vaccine delivery.

The 1998-2002 study showed that comprehensive, annual treatments of deer continued to significantly reduce fawning rates and that in a few areas where deer had been treated for 10 years that those localized deer populations had decreased significantly. Also, the study showed that deer could easily be darted with marker darts, marks remained visible long enough to complete treatments in an area, and that considerably less time was needed to dart individual deer.

In 2003, The HSUS, FIIS, NPS, and the USGS began the third phase of the immunocontraception project on Fire Island. Our goals are to discover how deep a deer population reduction can be achieved on Fire Island using only immunocontraception, to continue to monitor deer population trends across the island, and to develop new vaccine delivery strategies to more effectively control deer populations in communities that have not yet shown clear reductions. This phase will be run year to year with the intent of treating greater than 90% of the female deer population annually, monitoring that population to estimate annual fawning rates, and to determine the feasibility of the overall project.

II. METHODS

Darting and PZP Treatments. In 2004, female white-tailed deer were treated with 100 µg PZP emulsified in 0.5 ml of Montanide® ISA 50 adjuvant (Seppic, Inc.). Vaccine was stored frozen and then thawed and mixed in the field as needed. All deer treated were presumably at least one year old and/or had been treated in previous years with PZP and either Freund's Complete Adjuvant (FCA), Freund's Incomplete Adjuvant (FIA), or ISA 50. Of the 154 does successfully treated in 2004, 146 were unidentified and 8 were positively identified by monitors and/or darters.

Of the 154 PZP treatments on FIIS during 2004, 152 were delivered in combination 1cc/3cc vaccination/markings darts with barbless 2.5 cm needles (Pneu-Dart®, Williamsport, PA) fired from either a Dan-Inject® CO₂ injection pistol. The remaining 2 treatments were delivered to a couple extremely wary does using 1cc barbless darts fired from a Pneu-Dart® .22 cartridge-powered capture rifle. All vaccine was delivered in the hip or gluteal region of the deer. The marking substance used was non-toxic Sharpmark® red liquid livestock marker concentrate (Nasco, Fort Atkinson, WI).

Darting Locations. During the 2004 darting period female deer were treated at bait stations and along community streets in the areas of: (1) a seven contiguous community region which includes Kismet, Seabay Beach, Saltaire, Fair Harbor, Dunewood, Lonelyville, and Atlantique Beach, (hereafter collectively referred to as the West End Communities); (2) Robbins Rest and Atlantique, and a four contiguous community region, which includes Corneille Estates, Ocean Beach, Seaview, and Ocean Bay Park, (hereafter collectively referred to as the Mid-Island Communities); (3) Cherry Grove and Fire Island Pines (hereafter collectively referred to as the East End Communities); (4) NPS lands between the Fire Island Lighthouse and Kismet (hereafter collectively referred to as West End NPS land); (5) NPS lands between Atlantique Beach and Corneille Estates (hereafter collectively referred to as Mid-Island NPS land); and (6) between Oakleyville and Cherry Grove, between Cherry Grove and Fire Island Pines and the Talisman Heliport area (hereafter collectively referred to as East End NPS land) (Table 1).

Bait Stations. Deer were darted at seven bait stations located in monitors/residents yards, six on FIIS/NPS lands and one on community-owned lands. At the FIIS/NPS bait station sites automatic feeders designed to dispense bait at preset times were used to attract deer for darting. At monitor/resident stations bait was placed out by hand. Baiting started on August 15, approximately three-weeks prior to the start of the darting period and continued at most stations through September 24.

III. RESULTS

Logistics and Cost. Between 8 September and 24 September 2004, five darters working intermittently spent a total of 17 days in the field successfully inoculating a total of 154 female white-tailed deer. Deer were treated by personnel from The HSUS and FIIS/NPS with the volunteered assistance of several Fire Island deer monitors and residents. Deer were darted at 14 bait stations, including 8 FIIS/HSUS-run bait stations and 7 monitor/resident-run bait stations, in

11 communities and on NPS lands between the FIIS lighthouse and Fire Island Pines. Approximately 132 person hours were spent delivering the 154 treatments, averaging 7.8 person hours/day, 9.1 deer treatments/day, and 0.9 person-hours/treatment. Deer were also darted along community streets and on NPS lands as they were encountered. Approximately \$7636 was spent on vaccine (\$3360), bait (\$1114), a rental vehicle (\$1020), darting supplies (\$1410), and travel related expenses (\$732), at a cost of approximately \$49 per deer treatment (not including personnel costs).

In addition to manpower, FIIS provided a four-wheel drive vehicle, an all terrain vehicle (ATV), and two bicycles. Corn for the bait stations was paid for by The HSUS and distributed to bait stations primarily by FIIS. Several of the Fire Island community residents again provided us with areas for bait stations and storage in addition to ones provided by FIIS. The community of Saltaire and a Fire Island Pines resident provided housing for The HSUS personnel during the period.

Safety and Darting Efficiency. None of the 154 deer darted was injured during the darting period and all but three darts striking deer were recovered and tested for complete injection. One vaccination/markings dart stuck in a deer's hips at Station C (Judy Hamburg residence) and another marking dart stuck in a deer's hip at station D (Bruce Mayer residence). Neither dart was recovered due to both deer disappearing into heavy cover near the stations. In addition, one, 1 cc dart was lost in dense cover after striking a deer at Station 2 (Kismet Firehouse). There were a total of 4 complete misses with vaccination/markings darts. Three of these darts were recovered and disposed of and one dart was recovered and reused. An additional three vaccines and darts were disposed of due to contamination. In summary, a total of 160 vaccines were dispensed during fall 2004.

Treatment Locations. Of the 154 deer successfully darted on Fire Island in 2004, 62% were darted at bait stations and the remaining 38% were darted along community streets or in a few instances in semi-remote areas such as the Sunken Forest and Sailors Haven (Table 1). However, in communities without bait stations 100% of the deer found were darted along the streets (Table 1). While some of the deer darted along community streets might have eventually been darted at bait stations there were several deer darted along community streets that were often observed at bait stations, but failed to get darted there because of their wariness. Due to the shyness of some deer at bait stations it was often easier to roam streets around the bait stations and dart many of them as they were encountered.

Bait Usage. The amount of bait used in 2004 for darting 154 deer was 8450 pounds or 54.9 pounds/deer darted (Table 2). This amount is down from the 57.7 pounds/deer darted in 2001 when The HSUS and FIIS took control of acquisition and distribution of bait to all stations.

Marking dyes. In 2004, approximately 20% of the deer encountered were still in their summer coats or in transition from summer to winter. As a result, the Sharpmark red marking dye again remained visible on deer coats for times ranging from less than one day to over 14 days, depending on whether deer licked the site of injection and whether they were in summer coat,

winter coat, or in transition. However, during the process of baiting and darting deer each day, close observations made by darters revealed that once a deer had been marked, regardless of whether it licked the injection site or not, it usually retained some trace of the red dye for at least several days. Darting was usually concluded in an area when the majority of the female deer encountered showed signs, however faint, of the red dye on their coats. Between the daily observations made by the darters and observations made by several deer monitors in several communities, we estimate that we darted approximately 90 percent of the observable deer in the communities in 2004.

Population Monitoring. Deer density within the Fire Island communities has been estimated since 1995 on Fire Island using distance sampling techniques devised by Dr. Brian Underwood at USGS. Deer surveys using these techniques have proven accurate and between 1995 and 1998 indicated that deer numbers in the West End communities, where initial studies were focused, increased by approximately 11% per year. Since 1998 female deer in these and all communities between the lighthouse and Fire Island pines have been rigorously treated with PZP in marker darts. As a result, between 1999 and 2001 (prior to the fawning seasons) distance sampling surveys in the West End communities indicate a 35% reduction in the number of deer and an overall reduction of approximately 9% in all communities between the lighthouse and Fire Island Pines. Fawning rate estimates are still pending for 2004, but estimates since 1999 indicates that fawns annually comprise approximately 12-15% of the total deer population in the communities. Prior to the start of PZP treatments it was estimated that over 90% of the female deer population within Fire Island communities produced fawns annually.

IV. DISCUSSION AND CONCLUSIONS

Since 2000, when deer in all areas between the Lighthouse and Fire Island Pines began receiving PZP treatments, the number of deer darted has decreased each year (Table 3). Surveys in communities and at bait stations during the darting periods indicate that fewer deer are visiting them each year. While some deer simply will not visit a bait station when darters are present, monitors have documented significant decreases in the number of deer they see daily. Also, since 1998 the number of females producing fawns annually has decreased nearly 80%. Although a few does (10-15%) still produce fawns annually we have noticed that the majority of these fawns are being born late (i.e. after July 1). This indicates that the majority of the adult female deer population is getting darted each fall, but a few does simply do not carry sufficient PZP titer levels to get them through the entire breeding season. This phenomenon has been observed at other sites also. Regardless, the steady decline of the deer population, the decline in number of does being darted each year, and a significant decrease in the number of fawns being born indicates that the overall deer population between the Lighthouse and Fire Island Pines is steadily going down. Preliminary deer counts in 2003 by the USGS/NPS indicate that in some areas deer numbers have decreased 50% or more from what they were in 1998.

In addition to a decrease in the number of deer on Fire Island significant progress has been made over the past seven years toward achieving National Park Service objectives. The amount of bait used to attract and dart deer annually has been significantly reduced, time spent baiting and

darting deer has decreased significantly, the use of residential monitors to identify individual deer is no longer necessary, and backyard feeding has decreased significantly.

In 2004, bait use was comparable to the amount used in 2001, 2002, and 2003 and remained considerably less than that used in prior years. These reductions can be mostly attributed to using automatic feeders at all FIIS run bait stations and limiting the amount of bait residents/monitors receive. Automatic feeder stations have clearly shown that a large number of deer can be attracted to bait stations and then darted using relatively small amounts of bait. As a result, in 2005 we will convert all monitor/resident run bait stations to automatic feeder stations. This will allow The HSUS and FIIS to even more closely regulate bait consumption and reduce the amount of bait used each year even more.

During the 2004 darting period 2-3 people darted deer primarily at bait stations during the early morning hours and then combined sitting at bait stations and roaming community streets searching for deer to dart during the late afternoon and evening hours. This technique enables darters to dart the majority of the deer in each community in a relatively short period of time. While working in each block of communities HSUS personnel conducted surveys to determine the percentage of deer darted. These surveys revealed that over 90% of the deer encountered between the Lighthouse and Fire Island Pines, with the exception of Point O'Woods, carried marks indicating they received PZP treatments in 2004.

Finally, it should be noted that the total number of PZP treatments delivered in 2004 again decreased significantly from previous years (Table 3). This is due in part to a noticeable decline in the number of deer at most bait stations and the fact that no deer were darted within the confines of Point O'Woods. There was an estimated 15-18 deer in Point O'Woods to be darted in 2004, but since the community refuses to comply with the baiting and darting schedule established for other communities no deer have been darted there since 2002. Another reason for the decline is the wariness of some deer. In a few areas there are some deer that have been darted every year for the past 10 years. These deer have become very elusive and many of them will no longer visit bait stations. As a result, darting them has become extremely difficult given the confines of the island and communities. Fortunately, results from other study sites indicate that deer receiving PZP treatments for 5 or more consecutive years are not likely to produce fawns even if they periodically do not receive booster treatments.

LITERATURE CITED

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Table 1. PZP treatment locations and number of deer darted on FIIS during fall 2004

	West End Community	Mid-Island Community	East End Community	West End NPS Land	Mid-Island NPS Land	East End NPS Land	Total
FIIS/Community Bait Stations	24 (52.2%)	0	n/a	9 (81.8%)	0	1 (8.3%)	34 (22.1%)
Monitor/Resident Bait Stations	11 (23.9%)	31 (56.4%)	19 (63.3%)	n/a	n/a	n/a	61 (39.6%)
Roaming Streets	11 (23.9%)	24 (43.6%)	11 (36.7%)	2 (18.2%)	0	11 (91.7%)	59 (38.3%)
Total	46	55	30	11	0	12	154

Table 2. Bait station usage on FIIS (2001-2004)

Year	Bait usage (lbs.)	Number of Deer Darted	Lbs. of Bait/Deer
2001	12,000	208	57.7
2002	10,450	199	52.5
2003	11,000	180	61.1
2004	8450	154	54.9

Table 3. PZP treatment locations and number of deer darted on FIIS (1998-2004)

	1998	1999	2000	2001	2002	2003	2004
West End Communities	113	114	89	70	48	40	46
Mid-Island Communities	90	72	75	81	74	59	55
East End Communities	37	39	33	30	27	30	30
West End NPS	-	-	15	12	34	31	11
Mid-Island NPS	6	6	2	2	5	0	0
East End NPS	-	-	11	13	11	20	12
Total	246	231	225	208	199	180	154

Table 4. PZP treatment locations and number of deer treated by individual community during fall 2004

Station #	Location	Number Darded	Community/ Streets	Number Darded
1	Lighthouse tract	9	Lighthouse	2
2	Kismet Firehouse	9	Kismet	0
3	FIIS/Buteau	4	Seabay	0
4	Saltaire Dump	5	Saltaire	3
5	Dolphin Walk Dunewood	5	Fair Harbor	5
6	FIIS/Atlantique	1	Dunewood	2
7	FIIS/Robbins Rest	0	Lonelyville	1
			Atlantique	0
9	Sunken Forest West	1	Robbins Rest	0
10	Sunken Forest East	0	Corneille Estates	0
A	Seabay Pool house	6	Ocean Beach	14
B	Harry Baker/Saltaire	5	Seaview	4
C	Judy Hamburg/Corneille Estates	18	Ocean Bay Park	6
D	Bruce Mayer/Seaview	12		
E	Norman Steele/Seaview	1	Sunken Forest	11
F	Bud Verspoor/Cherry Grove	5	Cherry Grove	0
G	Lee Frey/Fire Island Pines	14	Fire Island Pines	11
Totals		95		59